WE CLAIM:

1. A method for generating singlet oxygen by reacting a polymer-immobilized photosensitizer with oxygen in the presence of visible light which is absorbed by the photosensitizer wherein the polymer-immobilized photosensitizer comprises a cross-linked polymer backbone to which is bound a plurality of photosensitizer groups and a plurality of cationic groups $^{+}QR_3$ wherein Q is selected from phosphorus and nitrogen, each R is independently a straight, branched or cyclic alkyl group of 1 to about 20 carbons or an aralkyl group and the average total number of carbon atoms in the group QR_3 is at least four.

2. The method of Claim 1 wherein the average total number of carbon atoms in the group QR_3 in the polymer-immobilized photosensitizer is from 4 to about 40.

3. The method of Claim 1 wherein the average total number of carbon atoms in the group QR_3 in the polymer-immobilized photosensitizer is from 12 to about 30.

4. The method of Claim 1 wherein all groups QR_3 in the polymer-immobilized photosensitizer are identical.

5. The method of Claim 1 wherein the polymer-immobilized photosensitizer comprises at least two different groups QR_3.

6. The method of Claim 4 wherein each Q in the polymer-immobilized photosensitizer is a phosphorus atom.

7. The method of Claim 1 wherein the photosensitizer group is selected from Rose Bengal, Eosin Y, Alizarin Red S, Congo Red, Orange G, fluorescein dyes, rhodamine dyes, Erythrosin B, chlorophyllin trisodium salt, salts of hemin, hematoporphyrin, Methylene Blue, Crystal Violet and Malachite Green.

8. The method of Claim 1 wherein the photosensitizer group is Rose Bengal.

9. The method of Claim 1 wherein the photosensitizer groups are covalently linked to the polymer backbone through linker groups.

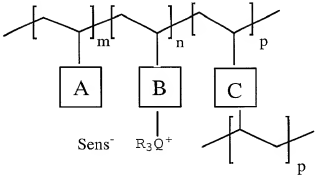
10. The method of Claim 1 wherein the photosensitizer groups are bound to the polymer by electrostatic attraction to the cationic groups.

11. The method of Claim 1 wherein each Q in the polymer-immobilized photosensitizer is a phosphorus atom, the average total number of carbon atoms in the group QR_3 is from 12 to about 30 and the photosensitizer group is Rose Bengal.

12. The method of Claim 1 performed in a solvent.

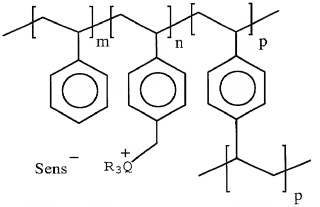
13. The method of Claim 1 wherein polymer-immobilized photosensitizer is in the form of small particles.

14. The method of Claim 1 wherein the polymer-immobilized photosensitizer has the formula:



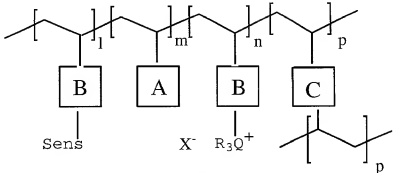
wherein A, B and C together with the two carbons of the polymer chain represent ethylenically unsaturated monomer units which can include alkyl substituents on the chains, A is a monovalent group selected from hydrogen, halogen, alkyl, aryl, aralkyl, carboxyl ester -COOR, oxycarbonyl,-OC(=O)R, and carboxamide $-C(=O)NR_2$, B and C are each either a bond or a divalent linker group selected from alkylene, arylene, aralkylene, carboxyl -COO-, oxycarbonyl, -OC(=O)-, and carboxamide -C(=O)NR-, wherein m, n and p represent the mole fraction of the respective monomer units wherein p is from about 0.01 to about 0.1, m is from 0 to about 0.95, n is from about 0.05 to about 0.95, wherein Q is selected from phosphorus and nitrogen, each R is independently a straight, branched or cyclic alkyl group of 1 to about 20 carbons or an aralkyl group and the average total number of carbon atoms in the group QR_3 is at least 4 and Sens is an anionic photosensitizer group.

15. The method of Claim 14 wherein the polymer-immobilized photosensitizer has the formula:



wherein A is a phenyl group, B is a benzyl group, C is a p-phenylene group.

16. The method of Claim 14 wherein the polymer-immobilized photosensitizer has the formula:



wherein A, B and C together with the two carbons of the polymer chain represent ethylenically unsaturated monomer units which can include alkyl substituents on the chains, A is a monovalent group selected from hydrogen, halogen, alkyl, aryl, aralkyl, carboxyl ester -COOR, oxycarbonyl,-OC(=O)R, and carboxamide $-C(=O)NR_2$, B and C are each either a bond or a divalent linker group selected from alkylene, arylene, aralkylene, carboxyl -COO-, oxycarbonyl, -OC(=O)-, and carboxamide -C(=O)NR-, wherein l, m, n and p represent the mole fraction of the respective monomer units wherein p is from about 0.01 to about 0.1, m is from 0 to about 0.95, n is from about 0.05 to about 0.95, l is from about 0.05 to about 0.95, wherein Q is selected from phosphorus and nitrogen, each R is independently a straight, branched or cyclic alkyl group of 1 to about 20 carbons or an aralkyl group and the average total number of carbon atoms in the group QR_3 is at least 4, wherein X is selected from halide and sulfonate ester and Sens is a photosensitizer group.

17. A method for oxidizing an oxidizable compound comprising admixing an oxidizable compound and a polymer-immobilized photosensitizer in a solvent, providing oxygen to the reaction mixture and irradiating the mixture with light to produce singlet oxygen for reaction with the oxidizable compound wherein the polymer-immobilized photosensitizer comprises a cross-linked polymer backbone to which is bound a plurality of photosensitizer groups and a plurality of cationic groups $^{+}QR_3$ wherein Q is selected from phosphorus and nitrogen, each R is independently a straight, branched or cyclic alkyl group of 1 to about 20 carbons or an aralkyl group and the average total number of carbon atoms in the group QR_3 is at least four.

18. The method of Claim 17 wherein each Q in the polymer-immobilized photosensitizer is a phosphorus atom, the average total number of carbon atoms in the group QR_3 is from 12 to about 30 and the photosensitizer group is Rose Bengal.

19. The method of Claim 17 wherein the photosensitizer groups are covalently linked to the polymer backbone through linker groups.

20. The method of Claim 17 wherein the photosensitizer groups are bound to the polymer by electrostatic attraction to the cationic groups.

21. The method of Claim 17 wherein the oxidizable compound is selected from vinyl ethers, vinyl sulfides, enamines, non-activated alkenes, dienes, and sulfides.

22. The method of Claim 17 used to prepare a dioxetane compound from a vinyl ether by a 2 + 2 cycloaddition reaction with singlet oxygen.